UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL ADJUSTMENT ADMINISTRATION

Saving the Soil

What It Means to Farmers and the Nation

The nation that destroys its soil destroys itself. The soil is the origin, not only of food, but of clothing and many of the most basic necessities of life. It is indispensable.

Heedless wastage of the wealth which nature has taken thousands of years to store in the soil cannot long continue without the effects being felt by every member of society.

Destruction of soil and depletion of soil fertility by overcropping and overgrazing in the United States are partly a consequence of the pioneer period of development and exploitation. No other nation in history has gone ahead so rapidly or so recklessly in the utilization of its natural resources. No other nation has been guilty of permitting soil destruction at a rate so appalling.

In the 300 years since settlement of this country began, and mostly within the last 100 years, 50 million once-fertile acres have been permanently ruined as productive land, according to the Soil Conservation Service of the Department of Agriculture. Another 50 million acres are seriously damaged. In addition, there are now in cultivation 100 million acres impaired by erosion and another 100 million acres on which erosion has begun.

Of the 1,907,000,000 acres representing the total area of the country exclusive of city and water territory, nearly two-thirds is in some degree affected by erosion.

The land permanently ruined by erosion within the last hundred years represents an area equal to all the farm land in two of the large mid-western agricultural States. If all this soil destruction had occurred in two States the consequences would be much more impressive but no less costly to the Nation.

First Concern is Saving the Good Soil

Much of the best crop land, which is relatively level and unaffected by erosion, has suffered serious depletion of fertility, due to continuous or too frequent production of cultivated crops.

While there is need for combating erosion on land that is already seriously damaged, the Nation's first concern is the soil that is still relatively productive. If all the money available for soil conservation were devoted to the land already ruined or nearly ruined, fertility of the land now productive would meantime be subjected to destructive forces. As a practical matter therefore, any sound program of soil conservation must recognize that an ounce of prevention is worth a pound of cure and must, first of all, provide for preserving the productivity of land to which the Nation must look for the bulk of its supply of food and fiber.

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I. Wise Use of the Land

Soil conservation is not a new problem. It has been fundamental in every civilization. It became a problem in America when the first settlers cut down the trees and plowed up the land. But it was easily evaded at that time. When the soil was worn out or washed away, there was, what seemed then, an inexhaustible supply of new land that could be had for the taking.

With the occupation of the last of the "free lands" suited to farming, the future of agriculture is confined to the land now farmed.

The two great soil-destroying forces, wind and water, are seldom harmful when nature is undisturbed. But when soil resources are used unwisely, wind and water write their tragic history in dust storms and in muddy rivers that carry the good soil into the ocean.

Sheet erosion, the type that removes a thin layer of the most productive soil from entire exposed, sloping fields, is prevalent in degrees ranging from slight damage to complete destruction on nearly half of the total area of 1,907,000,000 acres mentioned earlier.

Gully erosion has caused severe damage generally on approximately 337,000,000 acres, with about 4,000,000 acres so badly cut up as to be unfit for practical cultivation.

Wind erosion, resulting largely from cultivation, overgrazing, and depletion of the humus supply, has affected about one-sixth of the land area, principally in the semiarid regions of the Great Plains.

Over much of the Nation's farm-land area, the average depth of the topsoil containing sufficient plant food for economical crop production is only 6 or 7 inches. It has taken nature thousands of years to prepare this layer for productive plant growth.

The damage caused by washing away of the topsoil is further increased by the fact that loss of soil proceeds at a more rapid rate the longer it continues. The top layer of soil contains the largest percentage of humus which, because of its water-absorbing capacity, is one of the important erosion-resisting factors.

As inch after inch of the top soil is washed away, the layers underneath contain less and less humus, and are less able to hold the water and prevent washing. Erosion of subsoil is from one and one-half to four times more rapid than of surface soil.

Water-Holding Capacity of Soil

The protective covering of the soil and the humus content of the soil are two important factors that determine its water-holding capacity and the run-off rate of surface water.

Research several years ago at the Bethany (Mo.) Erosion Experiment Station, which now is under the supervision of the Soil Conservation Service, showed that where corn was grown continuously on an 8 percent slope, the loss of moisture as immediate run-off of rains was 27 percent of the annual precipitation. When alfalfa was grown on the same soil and slope the water loss was less than 4 percent of the annual precipitation and when timothy was grown, the water loss was only 8 percent of the annual precipitation.

Drought may be caused both by the lack of rain and a lowering of the water table, the subsoil moisture level. The rapid run-off of surface water on exposed areas which destroys the soil also results in lowering of the water table which intensifies the effects of drought.

The cost to the land of a cultivated crop must be reckoned in terms of the soil lost through erosion, the fertility removed by the crop and the fertility lost through erosion and leaching.

Even when little washing away of the soil takes place, land that is intensively cultivated may lose a great deal of its fertility through leaching or draining away of valuable mineral elements which dissolve in water. Rainfall on bare fields, loosened by cultivation, even when fields are almost flat, may soak rapidly through the soil, dissolving mineral nutrients such as phosphorus, potash, and calcium (lime) and, eventually, carry them into streams and rivers. Some leaching is, of course, inevitable. But leaching is increased by farming practices which leave the land bare of cover for long periods. It can be greatly decreased by use of grass and other protective crops.

Additions to and losses from plant nutrients contained in the soil are taking place constantly, but losses, in most cases, far outweigh the additions. Annual loss of soil fertility through erosion and leaching is estimated to be seven times the amount used by all crops.

Erosion and leaching on the harvested acres, according to the National Resources Board Report, cause annual losses of 88,000,000 tons of plant food elements, compared to 10,500,000 tons removed by crops. Erosion and leaching are responsible for 40.3 percent of the annual loss of organic matter or humus, while crops remove only 28.6 percent.

Increased Acreage of Cover Crops Needed

Destruction of soil and soil fertility is in large part the result of exposure to wind and water. Obviously, not all the land can be kept continuously in grass and hay crops, nor is it necessary. Sound farming practice which makes more frequent use of grasses and legumes and less frequent use of cultivated crops in the rotation, will in most cases, make possible the conservation of soil resources.

At the Bethany station, erosion research showed that when corn was grown continuously on a typical (8 percent) slope, the annual soil loss was 60 tons per acre. When alfalfa was grown on the same soil and slope, the soil loss was only two-tenths of a ton per acre. When timothy was grown, soil loss was only three-tenths of a ton per acre. It was found that by employing a 4-year rotation of corn, wheat, and clover, the annual loss of soil was about 10 tons per acre on the same slope and soil where the annual loss was 60 tons per acre when corn was grown continuously.

In numerous areas throughout the country there is land suited to crop production on slopes so steep that crop rotation must be supplemented by other erosion-prevention measures. Satisfactory supplemental control measures worked out by State and Federal agencies include terracing, contour cultivation, and strip cropping.

On silt loam soil with an 8.4 percent slope at Clarinda, Iowa, there was no measurable loss of either soil or water when corn was cultivated along contour lines but where the corn rows were planted straight up and down the slopes, the soil loss was 11 tons per acre and the immediate water run-off was 11.5 percent of the annual precipitation.

Strips of grass, legumes, small grains, or other close-growing crops alternated with row crops along contour lines on sloping land catch the washing soil and water and thus protect the field as a whole.

Erosion on the range lands is a consequence of overgrazing and the solution lies largely in giving the range a chance to replace its natural cover.

Not only do grasses and legumes protect the soil against erosion and conserve moisture and plant food by preventing rapid run-off of surface water, but when plowed under, they increase the fertility of the soil. Legumes are particularly effective in improving fertility of soil because they add to it nitrogen taken from the air.

Of the three plant-food elements—nitrogen, potash, and phosprorus—which farmers commonly purchase to apply to their soil, nitrogen can be supplied largely without cash outlay by legumes. The existing supplies of all three of these elements, stored in the soil by nature or added by farmers, can be greatly conserved by all the practices which prevent erosion.

II. Farmers and Their Income

No one knows better than the man who depends upon crop production for his living the importance of maintaining the crop-producing capacity of his land.

When productivity suffers through misuse of the land, the people engaged in agriculture are forced to a lower standard of living. But in periods of low prices farmers may feel that they are forced to sacrifice their long-time interests in the conservation of the fertility of their lands. Careful and conservative methods of farming may not return them enough money to meet fixed charges of debts and taxes. They may be compelled by the sheer force of competition at low-price levels to sell off their capital and let the farm plant run down even though they know that in the long run this will be costly to them and to the Nation.

The Soil Conservation and Domestic Allotment Act recognizes the importance of farm income and its relation to wise use of the land. President Roosevelt, in his statement at the time of signing the act, pointed out that one of its major objectives "is the reestablishment and maintenance of farm income at fair levels so that the great gains made by agriculture in the past 3 years can be preserved and national recovery can continue." Purchasing power of farmers has continuously been below the level of purchasing power of other classes for the last 15 years. This disparity has placed an economic burden on farmers which has had a direct relation to destruction of soil resources.

Patriotism and Profits

In the days when the Nation still had a frontier to conquer in the West and vast areas of undeveloped farm land, Europe was a constant market for its surplus farm products. Europe had loaned huge sums of money to what was then a new nation and invested heavily in the development of its resources. There were debts and interest to pay and exports of farm products helped to meet these obligations.

When the war started in Europe in 1914, the overseas demand for farm products was at once increased. When the United States joined the Allies, demand was further increased, both at home and abroad. Farmers were told that "food will win the war."

The combined effects of high prices and the appeal to patriotic duty induced farmers to plow 50 million acres of grass land for food crops. The supplanting of horses and mules by tractors and motor vehicles was responsible for the release of another 35 million acres of land which had formerly been used to produce hay, grass, and feed grains. This shift further increased exploitation of soil resources.

Mining the Soil and Giving It to Europe

The end of the war meant the end of much of the market for farm products and in 1920 farm prices started on the long downward trend which was not to be effectively checked until 13 years later. Loans to Europe, used to purchase American exports, postponed complete collapse of farm prices. When Europe could borrow no more the Federal Farm Board delayed, for a time, the inevitable price decline by pegging prices through the purchase of surpluses.

In the meantime the United States tariff wall was raised again in 1930 and this country's former customers retaliated with higher tariff and import quotas which virtually destroyed the remainder of its European markets for some farm products and reduced export demand for others. The trend toward nationalism, intensified by the tariff race and loss of purchasing power in the various countries, brought widespread efforts toward increased self-sufficiency. By 1932, the props under farm prices collapsed under the weight of agricultural surpluses which could no longer be marketed abroad.

In the period following the war that led up to the dark days of 1932 farmers were desperately mining their soil, not through choice but through necessity. When prices went down, farmers could resort only to producing greater volume in an effort to compensate for lower prices. Enormous surpluses of foods and fibers piled up, and with deepening depression and spreading unemployment, fewer people had money to buy them. For every bale and bushel resulting from forced production under abnormal farming practices there was another patch of land at the mercy of wind and water. Since the loans abroad were not repaid, this country in effect was mining its soil and giving it to Europe.

In the past farmers have benefited more directly than any other large group of this country's population from a free flow of trade with other countries. Sufficient food and fiber to supply domestic needs and a sizable share of the world markets can be produced without undue sacrifice of soil resources if farmers have the income necessary to enable them to practice safe soil management.

Relieving the Economic Pressure

The increase of cash farm income from 4⅓ to nearly 7 billion dollars during the 2½ years of adjustment programs partially relieved the intense economic pressure to exploit the land.

The programs of agricultural adjustment were concerned with good use of the land of cooperating farmers as well as with efforts to improve farm income and adjust crop acreage to effective demand.

The Soil Conservation and Domestic Allotment Act not only continues to protect farmers from economic pressure, but it provides definite rewards for positive action to conserve the soil.

Also, it is intended to reestablish and maintain farm income by helping to bring about a balance between the production of soil-

depleting cash crops and needs for these crops. The act sets up as a goal parity between the purchasing power of income of persons on farms and that of income of persons not on farms, taking the 1909–14 period as a base.

This provision recognizes the right of agriculture to keep pace with the rate of economic progress made by the Nation as a whole. It also recognizes the fact that agricultural income needs are determined by the number of people agriculture has to support. The depression, which destroyed the purchasing power of consumers of farm products, also added another burden to agriculture by forcing unemployed city workers back on the land.

A Nation-Wide Program

The national agricultural conservation program provides payments to individual farmers for voluntarily increasing acreage of soil-building and soil-conserving crops and for approved soil-building practices.

Three types of crops, classified according to their relation to erosion and soil fertility, are considered in determining eligibility for payments. Cash crops are, in general, the crops that deplete soil fertility and expose the land to serious erosion. Rates of payment have been worked out carefully to make it possible for farmers to plant more of their lands in soil-conserving and soil-building crops this year. For the first time, soil conservation will pay its way not only in the long run as it always has but also on an immediate 1-year basis.

The goal of the program for 1936 is a 30-million-acre increase over the 1930 acreage of soil-building and soil-conserving crops.

The program is administered in each State by the farmers themselves, in cooperation with the State extension service through county agricultural conservation associations and community, county, and State agricultural conservation committees.

All phases of the erosion problem are now being dealt with on a Nation-wide basis through the coordinated efforts of two Department of Agriculture agencies in cooperation with States and individual farmers. Effective control of erosion in the broadest sense depends upon combined application of sound principles of correct land use, employing engineering and cultural methods adapted to the needs of the land, and upon the maintenance of farm income at a level which will permit individual farmers to carry out the principles of correct land use. The Soil Conservation Service, under the provisions of the original Soil Conservation Act of 1935, is developing and demonstrating correct land-use practices and advising and assisting farmers in the application of these practices. The Agricultural Adjustment Administration, under the new act, is carrying out a national policy designed to make possible a fundamental change, farm by farm and for agriculture as a whole, from an exploitive type of farming to a conservative type.

Why Cooperative Action Is Needed

Without concerted action on a Nation-wide scale, there would be little hope of accomplishing the objectives of the act. A single State could not get its farmers to spend the time and money to rebuild fertility and improve the farm plant if most of the farmers of all other States were engaging in a competitive race to squeeze the

last dollar out of the land at once, forgetting about long-time interests in their need for immediate cash returns.

The law of self-preservation demands that a farmer give first consideration to providing for his family and himself. Sound farming practices which promote wise and proper use of the land produce the greatest ultimate returns and are of first importance to the Nation; but to the farmers the saving of the soil, though of vital importance, may become, by the force of circumstances, secondary to the stark necessity of making a living.

The Soil Conservation and Domestic Allotment Act provides the economic mainspring needed to overcome the competitive handicaps under which farmers operate. Under this act farmers may qualify for payments adjusting their operations in the interest of soil conservation and also benefit by the resulting improvements in the supply-and-demand situation affecting the price of their products.

The act thus provides farmers all over the country with an opportunity to replace soil-mining competition with soil-conserving cooperation.

III. Food for the Future

The third major objective of the Soil Conservation and Domestic Allotment Act is the assurance of stable and adequate supplies of food and fiber for consumers.

Farmers and the dwellers in cities and towns are in a vital sense dependent upon each other. Urban consumers are dependent upon farmers for their food and fiber, just as farmers are dependent upon other groups for the income which enables them not only to provide for their families but to treat their soil in such a way that they can continue for a long time to produce the food and fiber which consumers must have.

In terms of money, the direct toll of erosion is estimated at 400 million dollars annually. Loss of soil is a tax levied on every citizen of present and future generations. No matter how well an individual farmer might be repaid for soil losses, the Nation as a whole suffers the loss of an important resource in the form of the irreplaceable layer of topsoil.

The loss of topsoil directly affects the long-run cost of producing farm products and results either in higher prices to the consumer or a lower standard of living for the farmer.

The part played by improved farm purchasing power in national economic recovery has demonstrated the fact that consumers cannot afford to let prices for farm products fall to low levels. Farmers, through their renewed ability to purchase the products of industry, have indirectly reemployed millions of city workers.

Farm purchasing power, which in 1932 was only half the pre-war level, is now about nine-tenths of what it was in the years immediately preceding the war. Every type of business and industry has responded to the stimulus of a better farm market. The 1935 per capita farm income had a purchasing power equal to 83 percent of the pre-war farm income. Purchasing power of the income of nonfarm groups last year was 93 percent of the pre-war level. With a sufficient income and better farming practices, farmers can produce ample supplies for both domestic and foreign markets now and in the years to come.

Dust Storms and Floods

Denuding the land of its natural cover of grass and trees has been directly responsible for annual property destruction totaling millions of dollars as well as the loss of human lives. Nearly every spring newspapers tell the story of damage by floods along dozens of rivers when valley dwellers lose their property and those on the high land contribute to emergency relief work that follows in the wake of raging torrents. Erosion prevention cannot eliminate high water but it can often mean the difference between high water and destructive floods.

Floods in the 13 eastern States in the spring of 1936 are roughly estimated to have caused nearly 200 deaths and damage totaling at least $300,000,000 and to have rendered 200,000 persons homeless, besides crippling industries and transportation in many areas.

This is a part of the price which society has to pay for careless use of natural resources, and practices which strip land of its natural cover. Trees and grass hold back the surface water, give it more time to soak into the soil and regulate its flow into streams. Erosion increases volume and rate of run-off of surface water and decreases the water-carrying capacity of river beds through sedimentation which fills up the channels.

Sedimentation also destroys the value and usefulness of dams and reservoirs which represent investments of thousands of dollars in water power and irrigation projects. The National Resources Board report cites the almost complete filling with silt of the Harding Reservoir near Santa Ana, Calif., in a single month of heavy rains following the destruction by fire of the natural cover in the drainage basin from which it obtains its water.

Also, when the soil is denuded, the fact that moisture is not retained means that in time of drought, such as that which afflicted a large portion of the United States in 1934, there is even less moisture in the soil than otherwise would be the case. The dry soil, being exposed to the air, is caught up by the winds and blown for many miles. Dust storms in the West have occurred frequently in the last 2 years, menacing life and crops and damaging fertile fields.

Policies of Plenty

President Roosevelt has said that "the history of every nation is eventually written in the way in which it cares for its soil."

The United States is writing a new chapter in its own history. The American people have come to realize that policies of heedless exploitation of natural resources, though they may bring big production at the moment, really lead to scarcity. The "crime of the idle acres" is the mistreatment of land which results in the replacing of fertile land with desolate, eroded gullies, and fields from which the top soil has been blown or washed away.

Policies of conservation such as those embodied in the Soil Conservation and Domestic Allotment Act are the real policies of plenty. Wise and careful use of the land means plenty for farmers, plenty for consumers, and plenty for generations yet unborn.

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